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## THE MECHANISM OF MIND

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No problem has of recent years received more attention than that of the origin of mental traits. It is not my thought to review this discussion but rather to find some new method of approach which will carry us nearer the goal than the older views took us. Occasionally advances make such radical reconstruction that a discussion of older views becomes a waste of time. Such a change has been made by Mr. McDougall in his "Social Psychology." A careful use of terms enabled him to take the indefiniteness from the words "instinct" and "emotion" and give them a meaning for which objective marks can be found and objective tests may be applied. To be sure that a given action is natural there must be some specific inherited mechanism by which the act is performed. Our physical heredity is a group of such mechanisms, each of which has some antecedent in the germ cell. No act can therefore fairly be called natural that has no perceived mechanism aroused by specific antecedents, and, when aroused, acts in a specific manner regardless of the events that environ it.

The first test of inheritable traits is that they are the result of some mechanism whose elements lie in the original germ cell. Each instinct, however, is accompanied by a definite feeling. These feelings are our emotions, and with them are contrasted the acquired sentiments. If each instinct has a corresponding emotion, then we have a double check as to what is heritable. There must be some mechanism which results in an instinctive act and an accompanying emotion which arises when the act is performed. We need not decide whether the emotion precedes the instinctive act, or the act the emotion, if we may be sure that each is accompanied by the other, so that the existence of each may be tested by the presence of the other. It suffices to know that we thus have objective tests of what is natural and simple as opposed to the complex and acquired.

Seven elementary relations are found by Mr. McDougall to

meet this test: The instinct of flight and the emotion of fear; the instinct of repulsion and the emotion of disgust; the instinct of curiosity and the emotion of wonder; the instinct of pugnacity and the emotion of anger; the instincts of self-abasement and self-assertion and the emotion of subjection and elation; the paternal instinct and the tender emotion.

It is not my purpose to defend or criticise this list. The interests in it, whether we alter it or leave it as Mr. McDougall states it, is quite as much in what is excluded as in what it includes. Heredity is a powerful agent, but it lacks much of the definiteness we attribute to it. We must seek its complements before we can account for men as we find them.

We usually contrast nature with nurture, and put in nurture all which is not nature. By thus doing we confuse two different fields with mechanisms of a radically different character. To avoid this confusion I shall put in the province of nurture only that pertaining to physical elation or dejection. A truly natural instinct is aroused by specific stimuli, and when aroused, acts in one specific manner. There are no alternatives in the responses to instinctive situations. The impulses of surplus nutrition and deficit nutrition, however, are not the same. The elation of a surplus and the dejection of a deficit direct the current of thought and activity in peculiar ways, each having its own path and goal. This simple contrast and the laws that follow its perception have been overlooked because of a false standard of judging states of surplus and deficit. It is usual to measure the subjective result by the objective presence of a surplus or deficit of food. But a meager diet may yield a surplus of energy, while an overloaded stomach may transform food into toxins. The real test must be the actual transformation of food into energy, and not its quantity. Surplus energy is a physical state from which certain emotions arise, while a deficit of energy creates emotions of an opposing character.

The problem of energy is, however, not wholly determined by the assimilation of food since the lungs have an important function in creating surplus energy. Any bodily defect, on the other hand, or any failure to eject waste products, creates a state of deficit, and thus evoke the emotions that accompany this condition. We all feel these contrasted states, and on them many important emotions depend. To explain their physical antecedents we must first

realize that the normal outlet of energy is in some discharge. What is energy becomes by transformation activity. This may be muscular or sex activity, nervous stimulation, bodily secretions, the ejection of waste products, or similar transformation. Opposed to discharge we find distention, pressure and inflammation as indications that somewhere the bodily functions have failed to act properly. With this failure comes a deficit of energy and its manifestations. Discharge may thus be assumed to be the normal index of surplus energy and some local distention the corresponding index of states of deficit. If one prefers to say that states of deficit are due to the toxins accumulating in obstructed or overused organs, I shall not find fault with the statement. I am not searching for causes, but some measurable index. Although we cannot see the toxin, the results in terms of distention, pressure and inflammation can be observed.

The states of surplus and deficit may thus be measured in discharge and distention. The corresponding emotions are those of elation and depression. When the depression is diffused it is melancholy; when localized it is pain. A diffused elation is joy, and when localized it is called pleasure. Our joy and pleasure indicate the normal transformation of nutriment; melancholy and pain indicate some obstruction to these normal processes, with a resultant distention, pressure and inflammation. The pleasure of eating would cease if there were no discharge of fluids to mix with the food. The pleasure is in the discharge, and not in the contact of food and mouth. Nor is the accompanying muscular activity pleasurable except as there is a discharge of surplus energy through the muscles. In each pleasure some discharge of energy occurs, and to it the pleasure must be attributed. Evolution localizes and intensifies these pleasures, as it does also our pains, making their intensity equal their vital importance. If, however, discharge is pleasurable and its obstruction involves pain, my thesis has value, even if the complex cases need additional facts for their explanation. I am not trying to explain evolution, but the basis on which it rests. Nor is it necessary to show why discharge or distention produce these effects. If the connection is obvious they can rightly be used as the basis for further investigation.

The fundamental discharge is the sex discharge. Reproduction is the primary way in which a surplus is disposed of. In the

lower forms of life cell division is the index of a surplus. As life moves upward the sex act becomes the center of conscious interest, and is the normal outlet for surplus energy. All fundamental surplus emotions thus center about the sex act, and any restriction on it produces disorganizations which affect health, vigor, and even a normal existence. Take from an animal its surplus energy and the sex emotion dies. It gains in strength only in periods of the year when surplus nutrition is available. In winter sex is dead; in spring it becomes dominant. In the case of man the conditions may be more complex, but if properly analyzed they give the same result.

The action of a surplus is simple. It goes out in sex indulgence. A deficit forces a choice. The mind therefore divides actions into the essential and non-essential, and chooses the former. There is always a shrinkage in the presence of a deficit. The chosen part becomes the self; the rejected part becomes the non-self. The self thus shrinks under the pressure of a deficit but by the process becomes clearly defined. The impulse to save the self becomes the primary impulse of beings facing a deficit. Self-motives thus gain the place under the pressure of a deficit that sex impulses obtain when surplus prevails.

The moral in its primary sense is the self-preserving. Self-regard only becomes desecrated by the moralist when he acquires the concept of a soul. Then to save the soul he sacrifices the self. But he does not do this until he decided that soul preservation is more important than the preservation of body. The new self, the soul, is as dominant in the higher morality as the material self is in the old. Self-preservation and sex indulgence become more clearly opposed; the things most important to personal preservation coerce sex indulgence, while reproduction is at the expense of immediate personal advantage. Thus we have two contrasted forces which are dominant or recessive as external conditions favor the one or the other. The instincts are thwarted, while the nutritive impulses dominate so thoroughly that we mistake them for nature. This makes the contrast of instinct and impulse especially important. An instinct is an inherited bodily mechanism which acts under specific conditions and is accompanied by a specific emotion. An impulse is a tendency to activity not induced by some specific mechanism, but by the nutritive states of the organism. With overflowing energy we manifest one group of impulses; when re-

duced by a deficit we manifest an opposing group of impulses. Nutritive impulses are thus either conservative impulses with the thought of self dominant, or sex impulses through which the race is propagated. All nutritive impulses are offshoots of one or the other of these two. Fear is an active force in augmenting the self impulse, while love and sympathy reinforce the sex impulse. Practically, our natural disposition is banded in two opposing groups of tendencies instead of being unified.

Our mental mechanism is like an insect with no power to co-ordinate its wings, each being excited to action by the rays of heat that strike it. The movement of each wing thus tends to place the insect where the rays of heat strike the other wing, thus exciting its action and repressing its own. A crude advance results through the alternate action of the two wings. Another illustration is that of an oarsman moving a boat with one oar. By paddling first on one side and then on the other he goes forward, when if he paddled on one side only he would move in a circle. The self and the sex motives counteract each other in some such fashion, and by their alternate dominance a crude progress is insured which neither of them alone could produce. In this struggle self has gradually gained the dominance over sex with the result that our cultural forces are organized in ways that repress sex. This is the strength of Freud's position. Our wishes are sex wishes, however, only in so far as they reflect states of energy and surplus. But all dreams are not sex dreams, for dreams of self-preservation are frequent. When we overeat and digest we dream of love; when digestion goes wrong we have a nightmare. Bad digestion means dreams of demons, lions, bears, or impending disaster. The self is always the loser through some impending woe. This is as elemental a situation and as frequent one in dreams as those where in a glow of energy we seek to gratify our sex impulse. Both are primary nutritive impulses, and out of one or the other all our impulses arise. We cannot say with Freud that sex dominates the self, but we might say with Bentham that we have two masters. These two masters, however, are not, as he thought, pleasure and pain, but sex and self. The one subordinates personal motives to race welfare, while the other conserves the individual at the expense of the race.

We may now return to the contrast made by Mr. McDougall putting instinct and emotion in a definite relation to each other.

Instinct is a part of our nervous inheritance measurable in definite bodily reactions. Emotional states, however, are not due to these mechanisms. Their source is the glands and not the nerves. If this be true, we do not inherit our impulses as we do our nervous reactions. Had we an inherited nervous hierarchy we would be controlled by its reactions. There would also be that unity which philosophers admire. As it is, choice is real even if its antecedents are definite. We can will; we can inhibit; but to do it we must set the gland activity over against the inherited reactions of the nervous system. The nerves reflect past conditions. The glands voice the forces of the present environment.

When we know what the glands cast into the blood we can predict the emotion that results. The orders transmitted by the nerve are not self-created, but come from the dominance of emotions created by the transformations in the blood. The physical basis of consciousness is in blood chemistry, and not in nerve irritation. If this be true, self is not a reaction of some supreme nerve center, but is a flow that changes with the composition of the blood. Self is thus a changing emotion, not a stable control due to the centralization of the nervous system.

I do not mean to argue this contention, but rather to explain the phenomena of self on this basis and at the same time to connect my explanation with that given by the Freudian thinkers who of late have thrown so much light on the inner working of consciousness. It is not difficult to explain the facts of sex on my hypothesis, and this explanation will in the main agree with that of Dr. Freud. But beyond this point we separate. He regards the self as sex which is controlled to its detriment by outside agencies which he calls the censor. To my mind the censor is not external—tradition, morality and the like—but internal in the struggle of the gland and nerve for supremacy, or it may be in the struggle of different glands for supremacy.

This difference in explanation leads up to difference in analysis. If we think of consciousness as a phenomena of nerves many groups of facts remain unexplainable on any known basis. An appeal to mystery is found in all psychologists who base their system on nerves alone. This hidden part becomes psychoanalysis, subconsciousness, a divided self, or any of the dozen schemes in which the psychologists wander as soon as they enter the realm where nervous

reactions no longer explain the facts. Break up this monistic explanation to which psychologists adhere by giving another group of forces their proper place, and an explanation of complex data can be found that does not reach beyond the known facts of science. Dreaming is transformed into knowledge and mystery becomes obvious fact when we seek in the blood the source of the changes which nerve psychology fails to clarify. To make this change demands a new concept of self and a new view of the way in which self-control is exerted. Can a mere flow with no fixed location establish a control such as that which psychologists have sought in a centralized nervous system? If it can, mystery disappears when we go beyond the nerve and see what the gland is doing.

The main issue, therefore, is whether the self is a fixed nervous reaction wrought out by a slowly developing heredity, or whether it is made and remade each moment by our dominant emotions which in turn have their source in present gland activity. Do I change as my glands alter the composition of my blood, or do I change only as heredity alters my central nervous system? This is the problem, and the answer must come by giving some rational explanation of the evolution of the self. How can temporary flows create so stable a character that the results seem to imply an inherited mechanism?

I shall start the discussion of these problems at the point where my reasoning breaks with that of the Freudian school. The kernel of their position is that the organism has certain fundamental impulses or wishes which are censored by external conditions. The organic impulse is thus blocked and thwarted by external restraints, with the result that abnormal reactions are created which tend to disrupt the organic flow which would result in wish fulfilment. The censor and wish are in perpetual conflict, and by this fact the abnormalities of conduct are explained. A familiar illustration of objective restraint on internal impulse is the action of a mother in guarding her child from injury. The child sees a bright flame and stretches out the hand to reach it. The mother checks the movement in time to prevent injury. If this impulse and this checking is repeated often enough the impulse is restrained, not directly by the mother's act, but by the habit formed in the child's mind of stopping before the attainment is effected. A habit is thus in the

end the censor, but its formation is the result of an external restraint of which the mother's care is a good example.

I do not deny these facts nor the conclusion if the purpose is to illustrate the existence of a censor of impulses and one method of its formation. But it is a complex phenomenon that fails to bring out the nature of censorship which we must treat as an evolutionary product and seek for its source. If we take a low type of organism in which there is as yet no centralized control its activity would arise in this way. There would be in some tissue or gland an accumulation of surplus energy with a tendency to transform itself into activity. The transformation of latent energy into activity takes place through some shock received from the external world. The gland or tissue accumulating energy responds to some external stimulus and discharges when thus aroused. This circuit due to a direct interaction between organism and environment may be called *responsive behavior* as activity and external shock are closely related. There would be no self manifested in such behavior, nor any censorship.

In higher organisms where there is both brain and body the behavior is more complex. The shocks of the environment no longer are the direct source of action. The environment arouses brain activity, and brain activity is followed by bodily movement. It is in acts of this kind that a self appears and in which there is an exhibition of will power. The evidence of consciousness is taken as the final authority. We should, however, disregard this evidence and watch the processes active when the brain controls the body. In essence the brain is not different from the body. It is merely one segment of its loosely organized evolutionary predecessor specialized for given ends. It has every power of the original segment but nothing really new. If this be true, the circuit is now a gland activity which becomes emotion and then wish. This is carried over a connecting nerve to some body organ where it excites the same activity that in a lower organism would have come from a direct external stimulus. We have thus a double circuit—gland activity in the brain, followed by a nervous discharge which excites bodily gland activity from which activity results. This is the physical series when acts occur which we regard as willed or induced by conscious desire. Viewed as behavior, however, the desire is only a step in the circuit—a consequence and not a cause.

*Volitional behavior* differs from responsive behavior not in kind but in complexity. The brain starts bodily activity and also checks it. The fact is not in dispute. The problem is to discover the true antecedent. If there is a circuit, each part of which has some physical manifestation, behavior can be observed and measured. The failure to get an adequate explanation is due to an endeavor to explain all the facts in terms of nervous reactions. When this is done there is always a break somewhere in the explanation with a mystery which permits loose thinking about the sources of action. When, however, emotion is connected with gland activity instead of nervous reactions the series is explainable in physical terms, and the source of the censorship becomes plain. There is in every act a struggle for supremacy between the nerve and the gland, and each in turn gains a partial supremacy. We thus have a dualism of control instead of a nervous hierarchy. Nor is there any such thing as a centrally initiated process. All processes are flows; a perpetually interacting circuit that lasts all through life. The self is a phase of this circuit which originates no more than any other transformation through which the life process goes. Has thought a neural seat, a sub- or a super-conscious abode, or is it a flow that at points rises to self-consciousness? Each view has its presuppositions, its images and its conclusions. Between them we must choose.

But before a choice is made an additional complexity must be noted. This new phenomenon viewed as a conscious product is *delayed response*. Mind becomes more than volition when action is delayed and in the end determined by forces not in the primary circuit by which volitional control is maintained. In conscious terms we think of this new control as memory. The momentary stimuli of today are checked, and their tendencies thwarted by a repetition of the stimuli that acted on the brain yesterday.

This is delayed control viewed as a conscious product. The same thwarting of primary impulses takes place through the action of the imagination in the form of images and ideals. The self now gets, or seems to get, an objective reality. It is no longer a mere product of the primary life currents and becomes a soul endowed with superior attributes. I have no desire to deny these facts, nor shall I try to obliterate the distinctions thus created. We do have a soul; images and ideals gain a control and memory reactions become powerful enough to stay and transform the primary

impulses. This testimony of consciousness we should accept, but at the same time it should be reinterpreted in harmony with functions the body is capable of performing. The physical interpretation of mental life is correct if the conscious facts can be resolved into antecedent gland and nerve and muscular action. The soul is then not a new phenomenon, but a more complex form of underlying interactions. To make this point clear we must determine what physical changes lie back of delayed response. If this can be explained the more complex products losing their mystery become orderly facts.

The difficulty in getting the clue to explanation of delayed response comes from assuming that memory is its most elementary form. The soul thus seems to have a function not mechanically explainable. But if fancy and image making precede memory, the relation of this new series of facts to emotion and gland activity becomes apparent. We think of a child as having a memory when in reality it has only a very weak one, if memory is measured by adult standards. The child, however, fancies and builds images before it remembers actual occurrences with the detail which adults call truth. What it builds is rather beauty than truth, for it injects pleasing elements into its world that do not reflect the actual external contacts. The child gains in memory as it loses in surplus energy. A good memory is a loss of vitality cramping the power of image making. What is so plain in the case of a child is still visible, though obscured, in the case of adults. People with good memories are usually less original, and show indications of defective development. They are static in action and thought, thus showing that they have lost their early plasticity, which in turn indicates a loss of surplus energy.

With this explanation in the background we can gain an insight into the physical processes back of soul phenomena. We have in this another example of gland and nerve action. A new and more complex circuit is formed so that the soul censors the self as the self censors the primary impulses we call sex phenomena. The primary shock that excites activity first becomes imagination, then will, and then bodily action; otherwise stated, first the image, then the will, then the act. The complex is still of gland and nerve, for in image, will and act there are three separate gland flows brought into harmony by connecting nerve reactions. Depress the gland

action in the imagination and we get memory; depress it as will and we get habit; depress it in the body and senility results. The less the gland activity, the more the nervous control and the greater the mechanical control of life. The normal nerve always when excited repeats its former act. It holds the present firmly to the pattern of the past. Every lowering of vitality heightens this nervous control and increases the power of mechanical responses. Gland activity has no pattern. It never repeats itself exactly. Its power is in the blood flow, and any new content of the blood alters its action. When our glands are active our acts are patternless, and hence are not predetermined. We can thus be original even if we are not free. New combinations of emotion arise with each change in the composition of the blood. The image becomes wish, and the wish becomes action. The soul with its imagery controls instead of a mechanical self.

Rational thought is not a logical process but a psychic transformation. The concept that excites the most emotion excludes its opposite. The logically supreme concept is thus the emotionally superior concept. The self in struggle thus dominates through its emotional allies raising the level of consciousness to a point that excludes other motives. It is this tendency that deceives and falsifies. When the level of consciousness is high, thought seems unified, since the conscious emotions are those of struggle. When, however, the level of consciousness is lowered because of the absence of struggle, the old opposition reappears and normal motives reassert themselves. But they now seem not to come from the external world, but to spring from some inner source. A false psychology is thus created to meet this abnormal condition. Data are now attributed to a subconscious origin that really has an external origin from which, however, it has been cut off by epochs of struggle creating so high a threshold of consciousness that they are submerged for a time and then divorced from their origins. They come into consciousness as dreams, because in the dream world the threshold of consciousness is lower than in waking hours. All this must be made clear before the disguises of self and the disruptive force of struggle is apparent. Nor can they in turn be understood without recognizing the ways in which the level of consciousness is raised and lowered by changes in blood pressure. When it rises the details of perception fade and what remains is the symbol of what

disappears. A single element of an original may thus become the symbol of the whole and be the form by which it asserts itself in consciousness.

My thesis can now be restated in a more scientific form. The elements of the mind are instinct and emotion. Instinct is a nervous mechanism that reacts to certain stimuli. These mechanisms are in the body while in consciousness there are certain emotions that arise in connection with the same stimuli. All emotions, however, are not a mechanism in the sense that instincts are mechanisms, but a flow of nutritive energy. They are the product not of nervous mechanisms but of gland activity. While they seem immaterial and unmechanical they are both, if we recognize that antecedent to the emotion there has been a discharge of some fluid into the blood by which the emotion is aroused and the consciousness fixed upon certain objects. If it can be shown that the injection of given fluid into the blood arouses one emotion and represses others, the material antecedent of emotion becomes apparent even if the dissection of the brain shows no nervous mechanism to accomplish the desired end. Believers in the mechanical character of thought have looked in the wrong quarter for a basis of their claim. The seat of our important mechanisms is in the blood and not in the nerve. When this is recognized the road to thought antecedents is open and its mystery solved. The three elements in thought activity are nervous instincts, nutritive discharges which figure in consciousness as emotions, and the trophic action in the brain.

Students of mind as mechanism have also gone wrong in assuming that as mind is superior to body, so mental mechanisms are superior to those of body. What seems more absurd than that a superior result could be obtained from an inferior mechanism? And yet this is the case. The mechanical reactions of the brain are of a low order. The action in one part arouses a reaction in another not by some superior coördinating mechanism, but by a passage of energizing currents through the plastic parts of the brain. Tracks are thus formed along which energy habitually flows. As an adjustive device this method works admirably, but viewed as a mechanism it is of a surprisingly low order. I doubt if the mind has many nervous mechanisms above the level of trophisms, and yet its emotional flows are so effective that the

result is of a higher order than any nervous mechanism could give.

When a man says I can do as I please, I do not contest the fact but the explanation. I admit that there is no material mechanism corresponding to what we call will. The will is not a mechanism, but a discharge. Its antecedents lie in the blood and not in the nerve. To get will I must generate more energy with its accompanying elation until the threshold of consciousness is so elevated that no other outlet remains. Will as action is increased energy and an accompanying emotional exaltation. What we do is not what we want to do, but we want to do what we are doing. A rise in energy makes a wish which grows as the pressure to do the act increases. This is the thought Dr. Freud has emphasized stated as a normal, instead of as an abnormal, phenomena. The censor is wish as well as the censored. They are rival flows of energy directed by the nutritive discharges in the blood.

Another confusion arises as to the mechanism of inhibition. The disciple of self-mastery asserts that he can withstand all these wish or nutritive flows. And he is right. But how does he do it? Is not inhibition as material as action with causes quite as measurable? We can find inhibitory instincts in many quarters and can readily discover how they act when mere bodily functions. They range all the way from nightmare to stage fright, from shamming death to the limping bird suddenly frightened by your presence. In each case there is a flow that stops action. Could a stage-frightened man have his pulse measured the physical nature of the change would become apparent. Could his blood be tested a new content would be discovered. No one doubts the physical origin of these manifestations, and if so, no one should doubt his power to make inhibitions as soon as he learns how to arouse these discharges. He must get the essence of stage fright or nightmare without their antecedents.

Originally these discharges were brought about by their relations to instinct aroused by external contact. The instinct came first, and the emotional flow followed. Now external contact is seldom of the kind to arouse the emotional flow. In their place we have their symbolic representation in consciousness through wishes and fears. They arouse the inhibition that under antecedent conditions came through external contact. It is therefore true that if

I want to inhibit I can inhibit, but I can only do it by starting a gland action that prompts inhibition. My inhibition is thus quite as material as activity. Just as I can make myself angry by thinking of anger, so I can stop action by arousing the wish for inaction. The seeming will, however, in both cases is not cause but effect. Measure the nutritive flows and the thought current could be predicted. Reading other people's thought will become a science when we get measures for every change in the blood.